

## PART III

## Physical Description

Physical Regions of Washington

On the basis of surface features, Washington may be divided into eight general regions. Agricultural settlement is influenced by factors of topography, climate, soil, forest vegetation and water resources distinctive to each of the physiographic regions. Each has become a different type of farming area as settlers have learned to adapt crops and livestock to the conditions, or have improved limitations through drainage or irrigation.

Coastal Plains

A narrow, sandy plain with shallow bays, tidal flats, stream deltas and low headlands lies between the coastline and the Coast Range. It extends from the Columbia River mouth almost to Cape Flattery, being widest and lowest in the Grays Harbor and Willapa Bay districts. The climate is mild and damp with a long growing season, but it is too cool, cloudy and wet for most crops. Originally, this area was covered with heavy forests and much is now covered with woodlands. Lumbering and manufacture of wood products is the main industry. Farming is largely of the livestock and dairying type on low uplands and drained areas in the lower Chehalis River Valley. Cranberry growing is important and well-adapted to numerous, boggy areas in the Grays Harbor and Willapa Bay sections. The shallow bays are also used for oyster culture. Fishing is common in the rivers and coastal banks.

Coast Range

The Coast Range is an uplifted area of sedimentary and metamorphic rocks divided into the Olympic Mountains and the Willapa Hills. The Olympics tower to nearly 8,000 feet in a dome-like structure, carved deeply by rivers. These mountains have the heaviest precipitation in the state. Snowfields and heavy forest cover the mountains. Most of the wilderness area is within the Olympic National Forest and Olympic National Park, being managed for recreation, wildlife and timber. Farm settlement is limited to some foothill river plains and coastal terraces such as the Dungeness and Port Angeles districts along the Strait of Juan De Fuca. Here in the lee of the mountains, rainfall is moderate and irrigation is practiced by some livestock farmers. The Willapa Hills country is wet, heavily forested and carved into numerous narrow valleys. Logging is the main industry, combined with livestock farming in the upper Chehalis River Valley and along the banks of the Columbia River. Wet climate, hilly topography and the difficulty of clearing stump land retards agriculture.

Willamette-Puget Sound Lowland

A broad lowland, described as a trough or valley, lies between the Coast Range and the Cascade Mountains. The northern part is the Puget Sound Lowland which has been glaciated and occupied by the sea in the lowest section. The continental glacier reached slightly south of Olympia. Under a warming climate it melted and geologists believe it receded about 25,000 years ago, leaving an infertile plain of moraines and outwash gravels, sands and clays known today

as the Puget Glacial Drift Plain. Its rolling surface has numerous lakes and bogs. Most of the major cities--Seattle, Tacoma, Everett, Bellingham and Olympia--have been built on moraines bordering the Sound. Rivers, such as the Nooksack, Skagit, Snoqualmie, White and Puyallup, built up deltas and flood plains over the older gravelly plains. These narrow valleys are more fertile than the older glacial plains and support numerous small dairy, vegetable and berry farms. Most of the gravelly areas are wooded with a second-growth forest and are used for pastures. In the southern part of the Willamette-Puget Sound lowland, there are two large valleys--the Cowlitz and Chehalis. They drain a low, hilly area with several flat prairies and bottom lands.

Agriculture is handicapped by poor drainage and flooding of the river deltas and plains, by heavy winter rainfall, by cloudy but dry summers, by coarse, gravelly upland soils and by densely wooded land which is costly to clear. Advantages are mild climate and a location close to major markets for farm products such as milk, poultry and vegetables.

### Cascade Mountains

The Cascades are a wide and high topographic and climatic barrier which separates western and eastern Washington. The range is made up of sedimentary, igneous and metamorphic rocks which have been carved by glaciers and streams. High, isolated volcanic cones of lava such as Mt. Adams (12,397 feet), Mt. Rainier (14,408 feet) and Mt. Baker (10,791 feet) appear upon the older Cascade rocks. The Cascade crest varies between 3,000 and 10,000 feet and is higher across its lower passes in central and southern Washington. The Columbia River has cut a deep gorge and the lowest pass through the barrier. The western slope is wet and heavily forested with Douglas fir. The eastern slope is drier with a less-dense pine forest. Nearly all classified as forest land, most of the area is in Federal ownership in five national forests and Mount Rainier National Park. Tree fruit farming in the eastern slope valleys of Wenatchee, Chelan, Methow, Naches and the Columbia Gorge is most important. Sheep and cattle summer grazing on alpine grasslands is another use. Deep western slope valley bottoms such as the Skagit, Snoqualmie, Nisqually, Cowlitz and Lewis also contain livestock farms. The area is vitally important as a source of timber. Steep terrain, wet climate, short growing seasons and heavy forest vegetation are main handicaps for agriculture.

### Columbia Basin

A low plateau of old lava rocks covered with stream and wind-deposited soils extends in a series of plains, ridges, coulees and hills from the Cascades to the eastern Washington border. The area is basin-like in structure, being higher around its margins and sloping inward to low and level central plains. It has been sharply eroded by the Columbia River and its interior tributaries, the Snake, Yakima, Palouse and Spokane Rivers. The basin has sub-areas created by crustal movements and erosion.

The Yakima Folds are a series of hilly ridges extending from the Cascades eastward into the lower part of the basin. The Yakima and Columbia Rivers have cut gaps through the ridges and built up plains in the troughs between them. The rich, alluvial plain of the Yakima River is an important irrigated valley.

The Waterville Plateau is a tableland of thin soils overlaying basaltic rock at an elevation of 2,500 to 3,000 feet. It has gorges cut by the Columbia River and ancient glacial outwash streams once flowing in Moses and Grand Coulees. It is too high for irrigation and is used for dryland grain and livestock farming. The high plain is often called the Big Bend country.

The Channelled Scablands is a belt of dry terrain carved by ice-age rivers into a series of coulees. Bare rock is exposed in the coulees. Small plateaus between the old river channels have thin soils used for dryland farming. The Grand Coulee of this region has been developed into a major irrigation reservoir.

The Palouse Hills consist of fertile deposits of wind-blown soil overlaying basaltic lava flows. After being deposited in large dunes, the formation was reshaped by streams into an intricate pattern of low, rounded hills which are tilled for wheat, barley and legumes. The hills receive 16 to 25 inches of rainfall and have deep, porous and fertile soils. It is one of the richest farming areas of the Pacific Northwest.

The Central Plains are low and relatively level expanses of soil, deposited by old streams crossing the Channelled Scablands and later by the flooding of the Yakima, Columbia, Snake and Walla Walla Rivers. Climate is desert-like (6-12 inches of precipitation per year). The lower lands of the area, the Quincy and Pasco Basins and the Walla Walla Valley, are irrigated. Quincy Basin is a new irrigation area watered by Grand Coulee Dam.

Agricultural handicaps in Columbia Basin regions are mainly found in its dry, continental climate. Large irrigation systems build since 1900 have overcome much of the need for water on rich valley and basin soils. Dryland farming in higher areas is practiced widely, although occasional variations in rainfall, lack of snowfall, winter-kill, water and wind erosion inflict damage to field crops and to livestock ranges.

### Okanogan Highlands

A portion of the Rocky Mountains, consisting of well-eroded old granites, lavas and sedimentary rocks, extends across north central Washington. These are the Okanogan Highlands, the state's richest mineral area. Summit levels reach 4,000 to 5,000 feet with peaks exceeding 7,000 feet. Prominent north-south valleys are occupied by irrigated tree fruit and livestock farms. These are the Okanogan, Sanpoil, Kettle and Colville Valleys. The Columbia River Gorge through the Okanogan Highlands is occupied by the large man-made lake behind Grand Coulee Dam--Roosevelt Lake. High and wetter portions are forested with pine and larch, and are managed for timber and for livestock ranges by the United States Forest Service and the Bureau of Indian Affairs. Cold winter temperatures, short growing seasons, dry valley climates and distance from markets are farming handicaps.

### Selkirk Mountains

The Selkirks, a range of the Rocky Mountain system, extend into the northeast corner of Washington. The rocks are old mineralized granites and metamorphics reaching elevations of over 7,000 feet. The Pend Oreille River Valley

at the base of the Selkirk is an agricultural area of narrow bottom lands settled by livestock farmers. Nearly all of the uplands are in Kaniksu National Forest. While climate is cool and growing seasons are short, the Pend Oreille Valley has an advantage of being closely located to the Spokane metropolitan market area.

### Blue Mountains

The Blue Mountains are an uplifted and eroded plateau extending into the southeastern corner of Washington. The strata are mainly ancient crystalline rocks which contain some minerals. The highest point of the mountains in the Washington section is Diamond Peak (6,401 feet), on the divide between the Grande Ronde, Tucannon and Touchet Rivers. These rivers, and the Walla Walla River, have cut valleys into the plateau. Extensive pine forest and grassland areas are in the highlands within Umatilla National Forest, where rainfall is 30 to 40 inches. The Snake River has cut a deep valley and gorge across the lower parts of the mountains. The area is well developed agriculturally around its northern foothills where wind-blown soils are deep and irrigation systems are used. The Walla Walla and Tucannon Valleys are rich grain, legume and livestock areas grown under irrigation and by dry farming. Grazing is an important use of the high lands by livestock ranchers in the upper valleys.

### Topography of Lincoln County

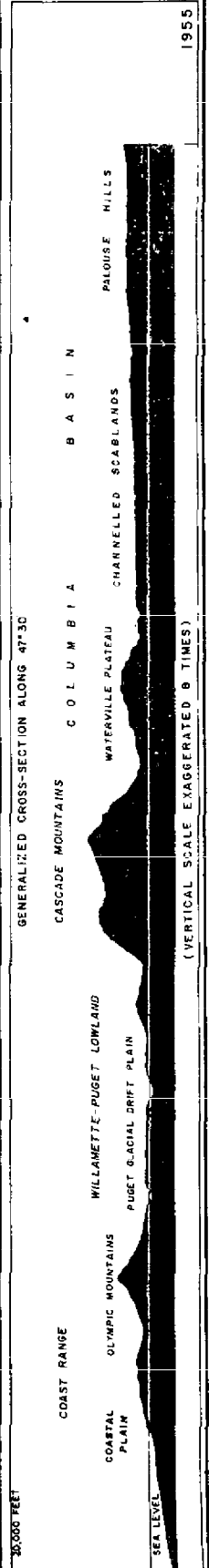
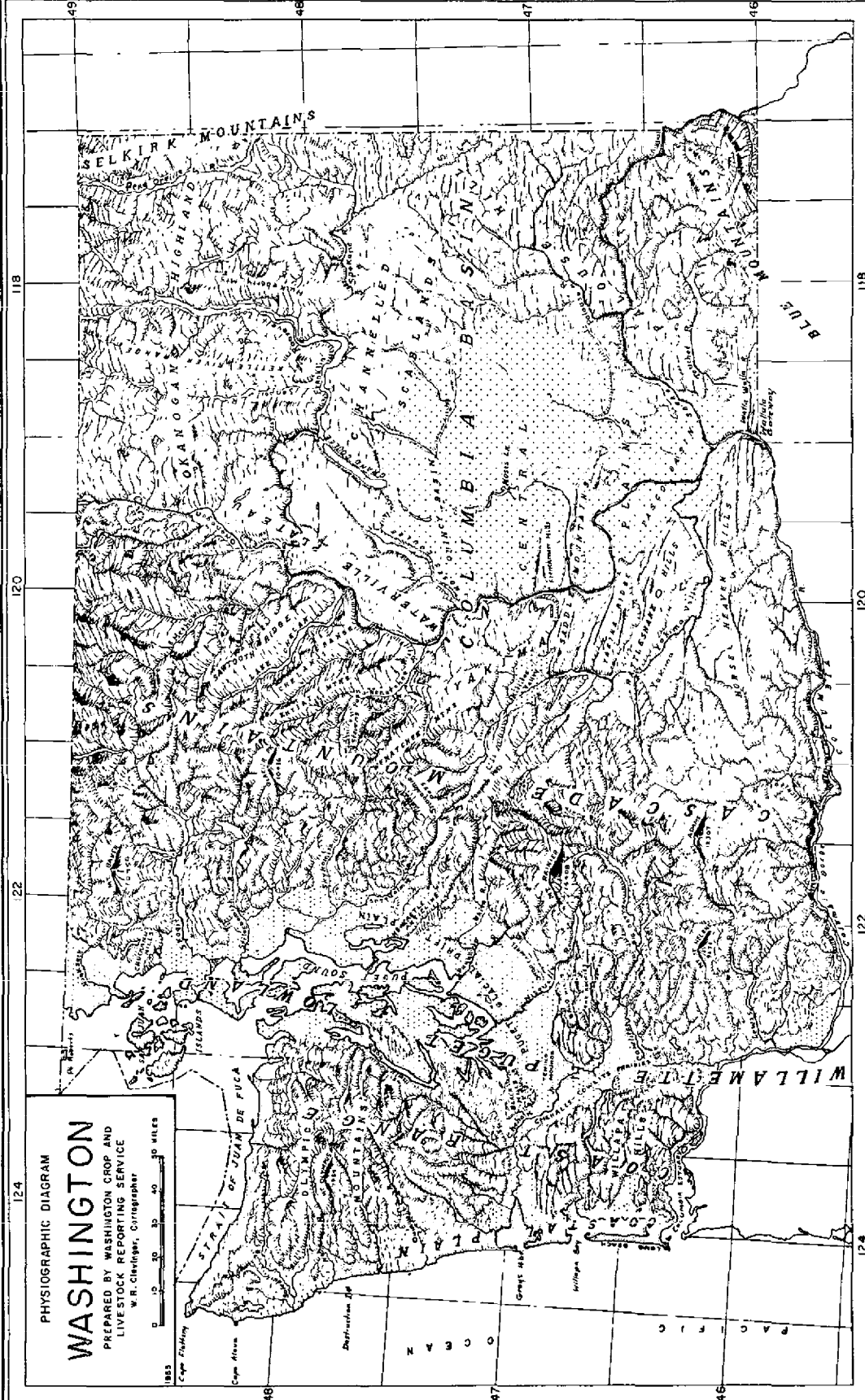
Nearly all of Lincoln County lies in the physiographic province termed by geologists as the Channelled Scablands. More popularly, this region is called the Big Bend Plateau. The area essentially is a plateau 1,500 to 2,500 feet in elevation with a system of channels or coulees eroded into bedrock by glacial rivers and streams of the recent ice age. These ancient rivers flowed from the northeastern highlands of Washington in a southwesterly direction. Part of the early drainage of the upper Columbia River watershed was carried through these channels during the ice age 20,000 or more years ago. Today, these channels remain as the beds of smaller streams such as Wilson Creek, Crab Creek, Cow Creek and Lake Creek and some shallow water bodies such as Colville, Sylvan and Tule Lakes. The plateau surface and the tablelands between the channels are gently rolling with wide expanses of wind-deposited soil suited for grain farming. In places, such as west of Davenport, bed rock or "scab rock" is exposed at the surface. In northern Lincoln County the terrain is more elevated and is rougher where the Columbia River has cut a gorge across the plateau. This gorge is now occupied by Franklin Roosevelt Lake, the reservoir behind Grand Coulee Dam. In general, it can be termed a plains area dissected by a few shallow stream courses with many of its features modified since glacial time by a dry climate and wind erosion.

### Land Classification and Soils

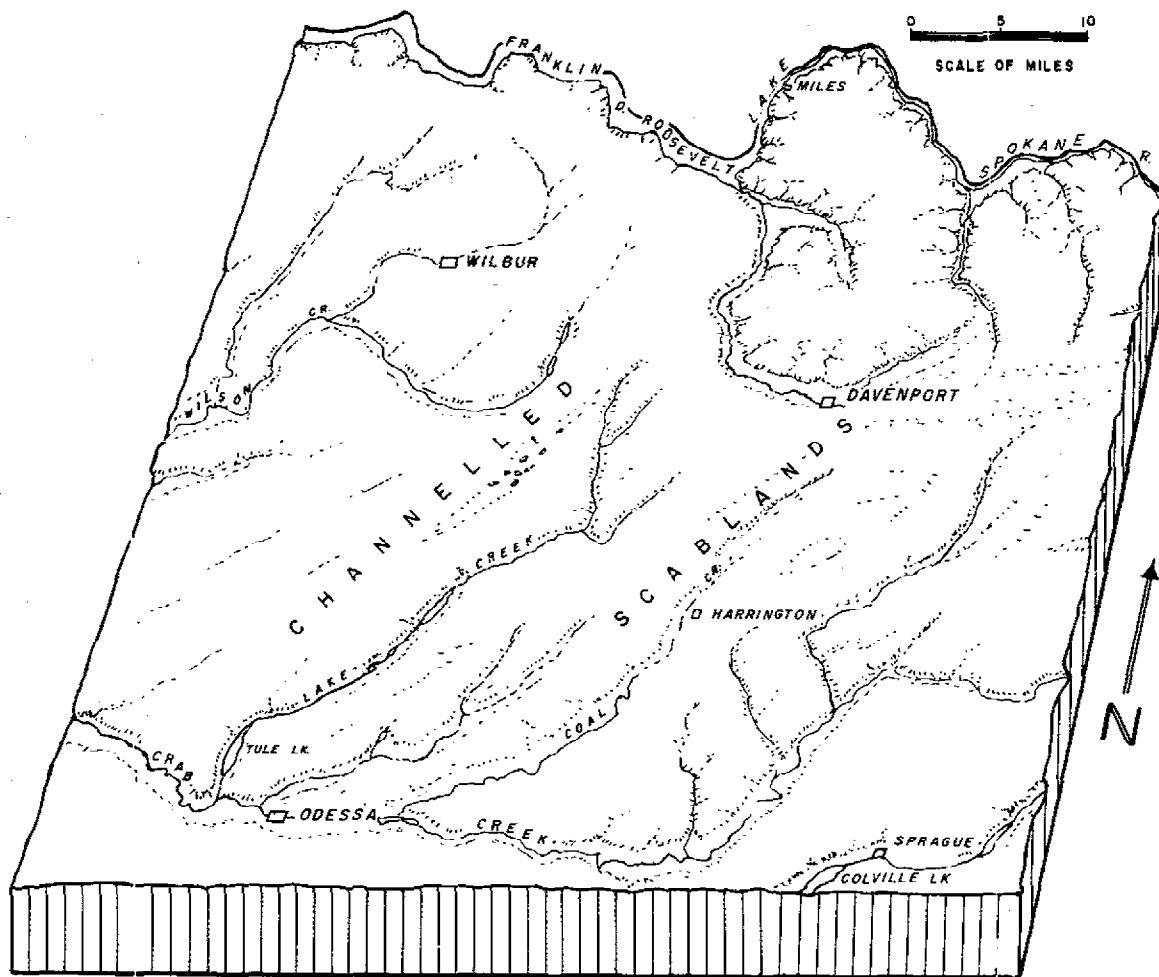
Lincoln County land is broadly divided into five general classes. Compared with other counties, a high proportion of its total land area is classified as Class II or good cropland. Lincoln County, according to recent land classification survey maps by the Soil Conservation Service and the Washington State Agricultural Experiment Stations, has more acres of Class II land than any other Washington county. A broad belt of Class II land extends from the southern county line in the Odessa district northeasterly to the Davenport and

PHYSIOGRAPHIC DIAGRAM  
**WASHINGTON**  
 PREPARED BY WASHINGTON CROP AND  
 LIVESTOCK REPORTING SERVICE  
 W. R. CLEGG, Cartographer

0 10 20 30 40 50 MILES



TOPOGRAPHIC DIAGRAM  
LINCOLN COUNTY



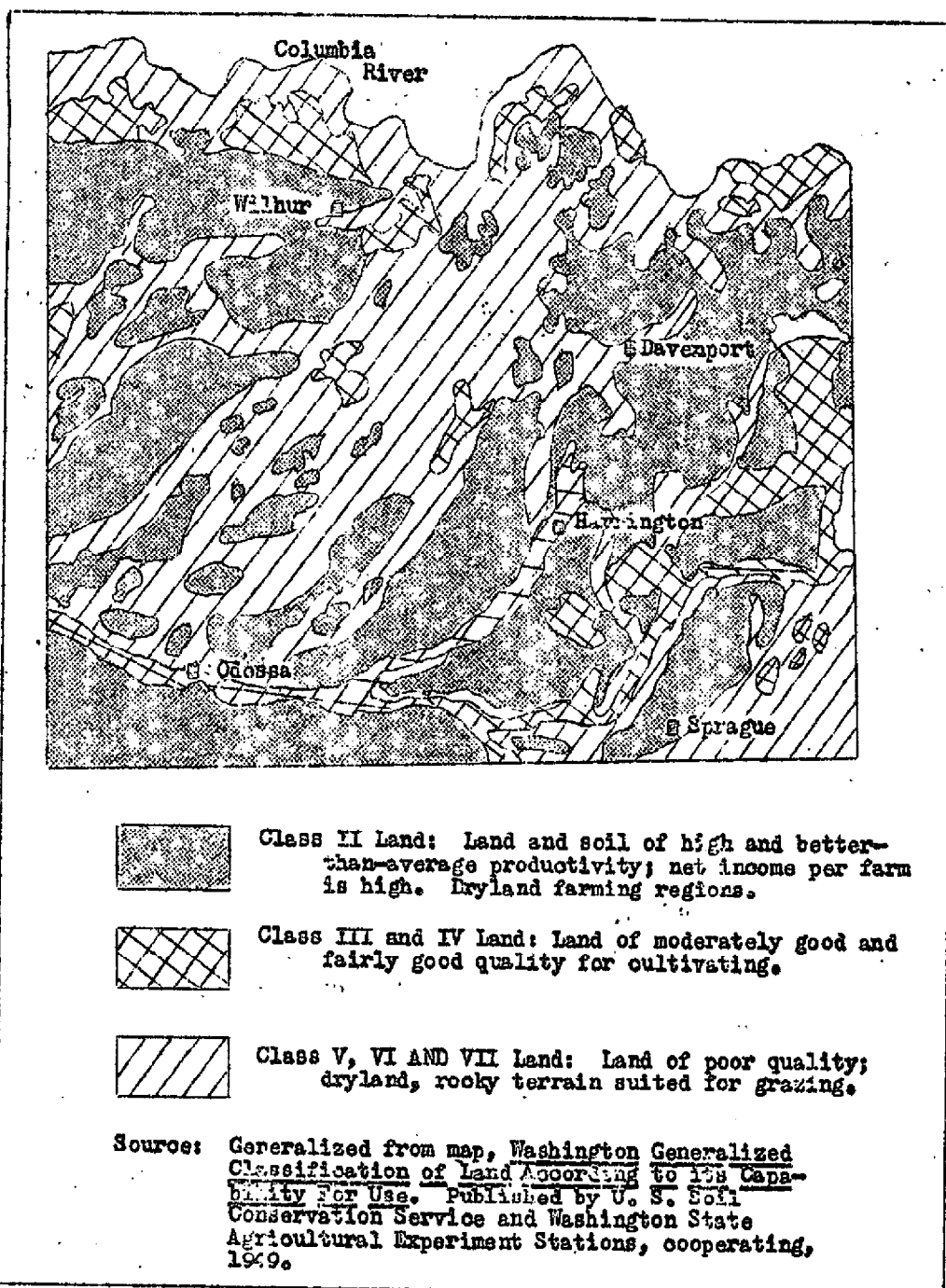


Figure 5.- General Quality of Land in Lincoln County

Reardan districts. Another belt of Class II land is in the Wilbur-Almira districts of northeastern Lincoln County.

Class II land consists of loess or wind-deposited soils termed Wheeler and Ritzville series. These soils are fine textured and deep; they retain moisture well and are well-suited for a dryland summer fallow, winter wheat type of grain growing. Formed under a grassland vegetation and under low rainfall conditions, these soils of volcanic and wind-deposited origin are rich in

minerals suited for good wheat and barley growing. They are also deposited in rolling plains accessible for agricultural machinery. Main handicap of the fine textured soils is their susceptibility to wind blowing when broken and kept loose for grain culture or idle summer fallow.

General districts of lesser productive land and soils are in northern, central and southeastern Lincoln County. The channel bottom lands of Crab Creek, Lake Creek and Wilson Creek are Class III and IV lands. Soils in these localities are less uniform in texture, being deposited by glacial action and streams. They are poorly drained and frequently flooded. Low areas are sometimes alkaline. When improved, such as through recent ditching in Crab Creek Valley near Odessa, they produce good crops. Lands bordering the channels are broken and rocky and are generally called scablands. Rough and unproductive land areas of Class V, VI and VII lands are the bluffs and slopes bordering the Columbia and Spokane Rivers in northern Lincoln County, and the upper Cow Creek Valley of southeastern Lincoln County.

### Climate

Lincoln County has a semi-arid continental type of climate which is hot and dry in the summer and cold and moderately humid in the winter. Temperatures are quite uniform over most of the county because terrain does not vary more than 1,200 feet from the lowest to highest elevations. Precipitation varies from an arid condition in the western part of the county to semi-arid conditions in the northeast. The entire area lies in the dry intermontane basin between the Cascades and the Rocky Mountain system. Precipitation is a major controlling factor in agriculture. Most crop farming is in a zone of 10 to 20 inch annual precipitation near the reliability margin for growing wheat. Climatic conditions require adherence to a dry farming system of summer fallowing grain land and fall seeding to take advantage of maximum precipitation of the winter months. Precipitation in the Big Bend region is unreliable. Fluctuations in snow fall and rainfall, creating top soil moisture deficiencies have in the past caused failures or low yields of grain crops.

Annual precipitation ranges from 8 inches and less along the western line of Lincoln County to over 20 inches in the northeastern corner. In general, the western two-thirds of the county has less than 16 inches of rainfall. Available data show that Odessa is the driest station with about 10.58 inches per year. Davenport, in the northeast, has 16.48 inches. The summer season of June through September is dry, characterized by occasional local showers or hail storms. The winter is cloudy and moderately humid and most precipitation is received as snowfall. Winter rains and snow melt are absorbed by Wheeler and Ritzville loam soils. By keeping the top soil stirred and loose through summer fallowing to lessen evaporation during hot summer days, a reserve of top soil moisture is accumulated for fall sown grains. A generally reliable snow cover of mid-winter also protects winter wheat and barley sprouts from freezing temperatures. In the past 60 years of recorded observations there have been variations of winter precipitation or winters of low snowfall which have caused serious winter-kill or grain or crop failure due to deficient top soil moisture. Slight variations of annual precipitation as well as temperature extremes are elements of risk for wheat and barley growing in central and western Lincoln County.



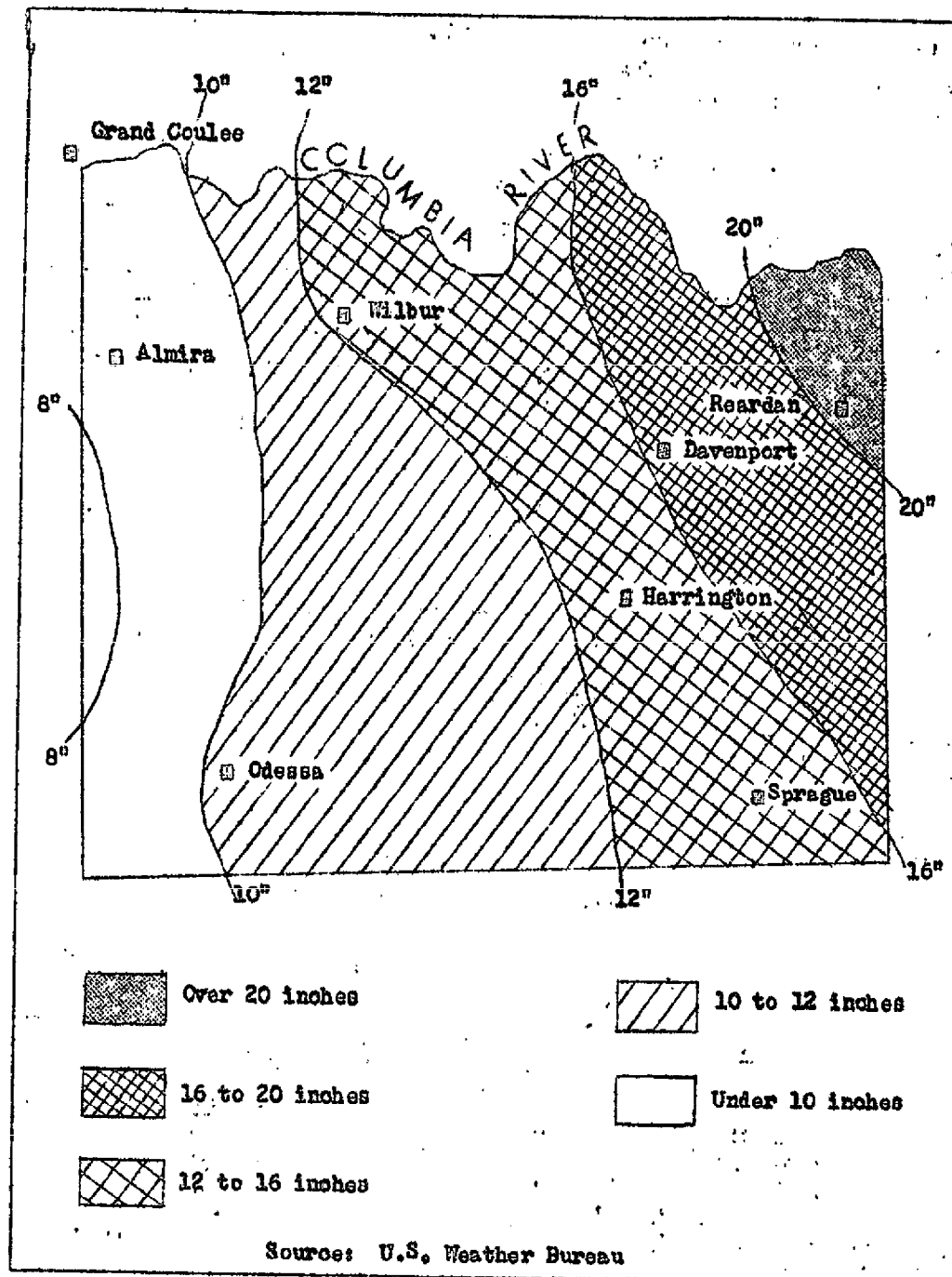


Figure 6.- Distribution of Precipitation  
Lincoln County

Monthly temperature averages range from below freezing in mid-winter to highs of about 65 to 71 degrees Fahrenheit in mid-summer. Records at Davenport, Odessa and Wilbur show that winter months are cold and summer months are hot. During December and January average temperatures range from 28 to 35 degrees while in July and August the range is from 66 to 71 degrees. During a 24 hour day in mid-winter, they range from 15 to 20 degrees at night to about 32 degrees at mid-day, while in summer mid-day temperatures are generally in

the 90's and down to 55 degrees at night. Cooler temperatures prevail in the more elevated area of northeastern Lincoln County and are warmest in the lower lands of the southwestern area.

Table 6.-- Temperatures For Selected Stations, By Months  
Lincoln County

| Station and<br>Elevation<br>in Feet | Average Temperatures<br>(in degrees Fahrenheit) |      |      |      |      |      |      |      |       |      |      |      | Annual<br>Average |
|-------------------------------------|---|------|------|------|------|------|------|------|-------|------|------|------|-------------------|
|                                     | Jan.  | Feb. | Mar. | Apr. | May  | June | July | Aug. | Sept. | Oct. | Nov. | Dec. |                   |
| Davenport (2,450)                   | 27.4  | 39.2 | 38.2 | 46.6 | 57.8 | 60.0 | 67.2 | 66.2 | 58.4  | 47.2 | 49.9 | 30.3 | 46.7              |
| Odessa (1,540)                      | 27.8  | 40.4 | 41.6 | 49.2 | 60.3 | 63.5 | 71.2 | 69.0 | 61.0  | 49.6 | 50.4 | 34.8 | 49.5              |
| Wilbur (2,178)                      | 30.8  | 40.7 | 38.8 | 47.0 | 55.6 | 60.0 | 66.4 | 65.2 | 57.0  | 47.4 | 49.7 | 32.5 | 46.9              |

Source: U.S. Weather Bureau, Climatological Data,  
Washington, Annual Summary, 1956

Table 7.-- Temperature Extremes, Dates of Killing Frost  
Lincoln County

| Station           | Temperature Extremes Recorded<br>(degrees Fahrenheit) |         | Killing Frost<br>Average Dates |               |
|-------------------|---|---------|--------------------------------|---------------|
|                   | Coldest   | Hottest | Last in Spring                 | First in Fall |
| Davenport (2,450) | -27   | 105     | May 27                         | September 23  |
| Odessa (1,540)    | -33   | 111     | May 17                         | September 23  |
| Reardan (2,500)   | -24   | 104     | May 19                         | September 20  |
| Wilbur (2,178)    | -30   | 110     | June 5                         | September 12  |

Source: U.S. Weather Bureau

Table 8.-- Precipitation for Selected Stations by Months  
Lincoln County

| Station and<br>Elevation<br>in Feet | Average Monthly Precipitation<br>(in inches) |      |      |      |      |      |      |      |       |      |      |      | Annual<br>Total<br>(inches) |
|-------------------------------------|--|------|------|------|------|------|------|------|-------|------|------|------|-----------------------------|
|                                     | Jan.   | Feb. | Mar. | Apr. | May  | June | July | Aug. | Sept. | Oct. | Nov. | Dec. |                             |
| Davenport (2,450)                   | 2.00   | 1.48 | 1.44 | 1.06 | 1.35 | 1.49 | .56  | .46  | .65   | 1.43 | 1.98 | 2.38 | 16.48                       |
| Harrington (2,167)                  | 1.38   | .95  | 1.05 | .81  | 1.04 | 1.36 | .45  | .29  | .81   | 1.35 | 1.50 | 1.76 | 12.75                       |
| Odessa (1,540)                      | 1.26   | .87  | .94  | .66  | .86  | 1.18 | .45  | .28  | .57   | .96  | 1.25 | 1.35 | 10.58                       |
| Sprague (1,025)                     | 1.66   | 1.26 | 1.33 | .96  | 1.05 | 1.21 | .34  | .35  | .82   | 1.56 | 1.82 | 2.18 | 14.54                       |
| Wilbur (2,178)                      | 1.52   | 1.07 | .98  | .86  | 1.11 | 1.24 | .44  | .30  | .67   | 1.25 | 1.57 | 1.74 | 12.75                       |

Source: U.S. Weather Bureau, Climatological Data,  
Washington, Annual Summary, 1956.

Temperature extremes and frost conditions are quite severe for agriculture. Killing temperature extremes of 33 degrees below zero and crop damaging high of 111 degrees of mid-summer have been observed at Odessa. These conditions are abnormal but are possible in any crop year. Frost conditions enable farmers to plan on growing seasons of only 135 to 140 days. Killing frosts generally occur until the last week of May and may occur again in late September. Short seasons limit growing vegetables and sensitive fruit crops and favor the hardy varieties of grain and hay crops which can tolerate mild frosts of April and May and late September. The elevated nature of the Big

Bend Plateau of between 1,500 and 2,500 feet contributes to a normal condition of short growing seasons. Temperature conditions cause Lincoln County to be a late season area of wheat and barley harvesting in Washington State.

#### Public - State Lands - Wildlife Resources

Portions of the uplands and croplands of Lincoln County are publicly owned and administered by the State of Washington, Commissioner of Public Lands. Out of the original lands granted by the Federal Government to the State of Washington in 1889 for schools and colleges, there were 82,264 acres located in Lincoln County. Between 1889 and 1956 the State of Washington sold 34,684 acres to settlers for agricultural and other uses.

State lands remaining in Lincoln County today comprise about 47,500 acres. Nearly all of this property is school land and nearly all is under rental for agricultural use. In 1956 there were 24,629 acres leased to livestockmen for grazing. Farmers raising grain and hay were leasing 21,800 acres for crops.

Wildlife resources of Lincoln County are managed by the Washington State Game Department. They primarily consist of upland game birds and trout fisheries. Grain croplands support a heavy population of ring-necked or Mongolian pheasants. Annual harvest of pheasants by hunters approximates 8,100 birds per season according to State Game Department statistics. Sage and sharp tailed grouse are minor game birds. Fishing areas for rainbow and cut-throat trout consist of nine publicly accessible lakes and Franklin Roosevelt Reservoir. Columbia River, Crab Creek, Wilson Creek and Spring Creek are planted with trout annually.